

The UTAH TEAPOT

A QUARTERLY NEWSLETTER FOR THE ALUMNI AND FRIENDS
OF THE UNIVERSITY OF UTAH SCHOOL OF COMPUTING

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The teapot was one of the first free-form models used in computer graphics. Since it was created at the University of Utah (by Martin Newell) in 1975, the teapot has become a favorite computer graphics benchmark. The teapot symbolizes Utah's distinguished leadership in computer graphics.

New Virtual Environments Laboratory

by William Thompson and John Hollerbach

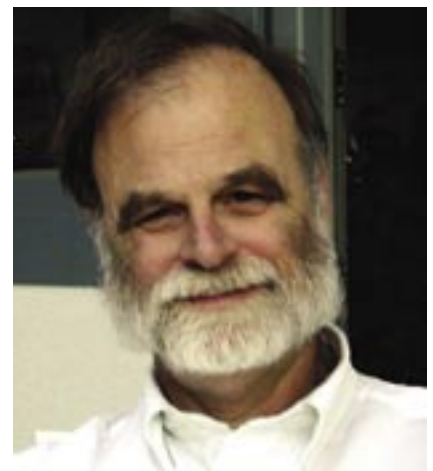
This fall, the School of Computing opened its new Virtual Environments Laboratory (VEL). The lab houses the Sarcos Treadport, a unique device capable of simulating realistic locomotion through large virtual spaces, and a state-of-the-art head-mounted display (HMD) system. Virtual environments provide the sensory experience of being in a computer generated, simulated space. They have potential uses in applications ranging from education and training to design and prototyping. The utility of current generation virtual environments is limited by a lack of accurate perception of simulated spaces and an associated lack of realism in interacting with the simulated spaces. Much of the research being performed in the new laboratory is based on the thesis that combining motor and visual information in an effective way helps optimize performance when people interact with virtual environments. Faculty working in the laboratory include John Hollerbach, Pete Shirley, William Thompson, and Pete Willemsen from the School of Computing and Sarah Creem-Regehr from the Department of Psychology. Students are drawn from the School of Computing, Mechanical Engineering, and Psychology.

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2004 Organick Memorial Lectures Series Presents, Jim Gray, April 20-21, 2004

This years lecture will be given by Jim Gray, a Distinguished Engineer in Microsoft's Scalable Servers Research Group, and manager of Microsoft's Bay Area Research Center.

He is an ACM, NAE, NAS, and AAAS Fellow, and ACM Turing Award Winner, cited for "seminal contributions to database and transaction processing research and technical leadership in system implementation". He is editor of the Performance Handbook for Database and Transaction Processing Systems, co-author of Transaction Processing Concepts and Techniques, and is editor of the Morgan Kaufmann series on Data Management. He holds doctorates from Berkeley and Stuttgart. ☐☐



Jim Gray

For more information about the Organick Lecture series go to: www.cs.utah.edu/dept/organick



Hank & Elena Driskill

It was at the University of Utah during Winter quarter of 1989 that Hank and Elena Driskill first met. Elena had just moved to Utah to pursue her graduate degree in computer graphics; Hank was currently enrolled in the graduate program. The two recall that it was in Rich Riesenfeld's graphics class that their romance began, and in September of that same year they were married.

After completing their studies at the U, they moved to Venice, California where Hank went to work for Digital Domain and Elena began a job at Disney. After a stint at Digital Domain Hank left to join his wife at Disney Feature Animation where they are both presently employed. The two have since purchased a home in Valencia, California where they currently reside with their two daughters Ceridwen and Maeve.



Hank and Elena Driskill with their daughters Ceridwen and Maeve

Utah Teapot: When did you graduate from the University of Utah?

Elena Driskill: My dissertation is dated 1997. However, Hank and I left Utah in September of 1994 to go work.

Hank Driskill: I came back in summer 1995 to defend my dissertation.

UT: What was your education like at the University of Utah.

ED: It was challenging, at times frustrating. I liked having the opportunity to be a teaching assistant and later a research assistant.

HD: Hard. Frustrating. Not

always a good or easy thing to do, but in retrospect it was all a good thing to have done.

UT: Why did you choose the University of Utah?

ED: It was a good school for computer graphics. I chose to go into computer graphics because

profound to me: "You don't take an exam over a topic, you take it over a professor". I learned a lot from that, the recognition that who you're dealing with can be as important as the topic you're discussing.

UT: What has changed for you the most since you were a student?

HD: With me, so much has changed. I got out of school, started writing tools for visual effects films, and then moved into management roles. I'm currently technical supervisor on film projects.

ED: I feel like I have a lot more confidence in my abilities now. Going through the Utah graduate program and finishing, having this job, and Hank being my cheerleader has all had a lot to do with this.

UT: Do you have any stories from your time at Utah?

ED: I remember that if you wanted to get rid of any sort of leftover food, you could leave it in the student lounge and it would be gone very quickly; come to think of it, that's the case at work now, too.

HD: I can think of funny things we did: the pyramid of coke cans we built in the graphics lab during a particularly sleepless weekend, or taking over people's mice remotely and drifting the cursor out of their windows while they typed.

UT: How about memorable classes and classroom experiences?

ED: The graphics-related classes

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The Driskills

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were fun. I liked learning Lisp and working on the Rover project. Being a teaching assistant for Elaine Cohen's CAGD class was a challenge, but I learned a lot from doing it.

HD: The first year, trying to finish the AI/Expert Systems, Graphics and CAGD classes all at the same time, was very memorable in a painful way. The wonderful group we had in the graphics lab, and the grad students in general are memories I carry with me to this day.

UT: Tell us about the paths your careers have taken. Was it what you expected?

ED: I've been at Disney Feature Animation since leaving school. I've just had my 9-year anniversary. I'm now working on subdivision surface tools and the digital production pipeline. I never really thought about working in the entertainment industry. I imagined going into something more boring and practical. I've come to realize that entertainment is really important for people's sanity. Plus there's something really neat about working on movies that will be watched and loved by generations.

HD: I knew since high school that I wanted to get into the movie business, making effects for films. More or less, yes! I've loved what I've done, I'm proud of what I've accomplished, I love whom I do it with. The computer effects and animation industries are full of so many amazing talents, both technical and artistic, that I consider myself very lucky to be a part of it.

UT: What has been your biggest professional or personal accomplishment?

ED: I pitched a story idea for the final *Fantasia 2000* segment shortly after I got to Disney and it got accepted and eventually, after lots of work by lots of people, was made into the Firebird sequence.

HD: I have two wonderful daughters who think I'm pretty cool, and a wife who still puts up with me after 14 years together. That pretty much outweighs anything else.

When not engaged in their careers at Disney, the Driskills enjoy many different hobbies that keep them busy. Elena enjoys spending time in the garden, reading, and drawing. She is also in charge of her daughter's Brownie troop this year. Hank continues to pursue his love of computers and computer graphics and remains a passionate video game fan. Hank is also an avid DVD collector. ☐☐

If you are interested in contacting the Driskills send email to: elena.driskill@disney.com or hank.driskill@disney.com.

E&S

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2004

DISTINGUISHED LECTURE SERIES

The Distinguished Lecture Series is made possible by a generous gift from the Evans & Sutherland Corporation. This is the 12th annual Evans & Sutherland sponsored lecture series. We are grateful for their generous support.

"We are pleased with this year's lecture series line-up and look forward to hearing from such noteworthy speakers" said series organizer Emil Praun.

Peter Schröder

CalTech
"Digital Geometry Processing"
Wednesday, February 4, 2004

Randy Pausch

Carnegie Mellon University
"An Interdisciplinary Approach to Virtual Reality"
Monday, February 23, 2004

Natarajan Shankar

Stanford Research Institute
"Little Engines of Proof"
Monday, March 1, 2004

Eric Grimson

MIT
"Computer Guided Surgery"
Monday, March 8, 2004

Gene Myers

UC Berkeley
"Whole Genome Sequencing, Comparative Genomics, and System Biology"
Monday, March 29, 2004

We invite all alums to attend.

Refreshments 3:20 pm

Lecture 3:40 pm

All lectures are held in 103 Engineering and Mines Classroom Building.



New Virtual Environments Laboratory

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The Sarcos Treadport is the most capable device yet constructed to simulate unrestrained human mobility such as walking and running in simulated environments. It is built around a 6' x 10' computer controlled treadmill, surrounded by projection screens providing a 180 degree horizontal field of view. The treadmill can be tilted under computer control, allowing simulation of locomotion over slanted and uneven surfaces. A mechanical tether is used to track a person's position on the treadmill, allowing users to control their own walking pace with the speed of the treadmill belt adjusting as necessary. One of the unique features of the Sarcos Treadport is that the tether is capable of applying a force to the observer that has the effect of simulating the added efforts involved in walking up a slanted surface and in changing translational velocity. The graphical display system provides a degree of wide field of view visual immersion unavailable with any other virtual environment locomotion device. Head-tracked directional sound is being added, and atmospheric effects such as directional wind gusts are being planned.



Sarcos Treadport

The head-mounted display system installed in the new VEL utilizes an nVisor SX HMD together with an InterSenseIS-900 head tracker which covers a 20' by 30' walking area. The HMD facility supports research focusing

on increasing the effectiveness of computer graphics (CG) in conveying information about the three-dimensional world. This is an interdisciplinary effort involving computer graphics, perceptual psychology, and computational vision. We are interested in better understanding the spatial information potentially available in CG imagery, determining what spatial cues are actually used when CG imagery is viewed, and using this information to inform the development of improved rendering algorithms.

Using funds from then Governor Leavitt's Engineering Initiative and with the backing of the College of Engineering, the room for the VEL was built to foster the virtual experience and flexibility in research. This includes sound and light absorbing black materials on the floor and walls, a high ceiling without obstructions, and a large 55' x 33' floor space. The result gives a theater-like impression, and makes the VEL a popular tour venue and recruiting tool for students and faculty. ☐☐



Head Mounted Display

For more information about the Virtual Environments Lab go to: www.cs.utah.edu/research/areas/ve

“New” Faculty Member in Virtual Environments Lab

Pete Willemsen transitioned from post-doc to Research Assistant Professor in the School of Computing this fall. Pete started working for the SoC in the summer of 2000, where he has been collaborating with the visual simulation, robotics and graphics groups. He earned his M.S. and Ph.D. in Computer Science at the University of Iowa. “With its good reputation and the interesting work that is being done, I felt the SoC was an interesting place for me to further my academic career,” said Willemsen.

Pete is currently working in the Virtual Environments Lab where he is investigating how people interact with virtual environments. Specifically, he is focusing on how immersive display systems, such as head-mounted displays, affect the perception of distance in virtual environments.

While not at work Pete can be found enjoying many of the outdoor activities that Utah has to offer. ☐☐



Pete Willemsen

Research Experiences for Undergraduates Program

One of the ways in which our current computer science undergraduates can enhance their education is to participate in the Research Experiences for Undergraduates (REU) program, sponsored by the National Science Foundation. Faculty members with research awards from NSF



Heballa Al-Zahawi

are encouraged to apply for REU supplements. The REU funding provides income to undergraduate students so that they may participate in ongoing research projects. This gives them the chance to learn how to do research at an early stage in their career, prepare for graduate

school, and work more closely with a faculty mentor. According to NSF, “The REU program is a major contributor to the NSF goal of developing a diverse, internationally competitive, and globally-engaged scientific and engineering workforce. It draws on the integration of research and education to attract a diversified pool of talented students into careers in science and engineering and to help ensure they receive the best education possible.”

Within the School of Computing, several faculty members have solicited and received REU funding. In the past year, Dr. Ganesh Gopalakrishnan received a REU supplement. He views the work of his undergraduate researchers as an

important contribution to the overall project. “Our bright undergraduates are always on the lookout for challenging assignments that give them a taste for research...they are very eager to learn,” says Dr. Gopalakrishnan of his REU students. The research experience broadens their learning experiences.

Dr. William Thompson and Dr. Pete Shirley also mentor students under the REU program, working on the NSF-funded project, “Perceptual Aspects of Locomotion Interfaces.” They recruited one of our current undergraduate students, Heballa Al-Zahawi, to work on this project in the newly completed Virtual Environments Laboratory. Describing her involvement, Heballa says, “I am very interested in computer graphics and the research area of space perception and interaction in virtual environments. I believe that this is a good opportunity for me to learn more about this research area.” Working on the project is more than just a short-term experience for Heballa. She views it as “an opportunity for me to get to know people in the graphics community and build connections. Also, having good research skills is an excellent asset, especially in graduate school and also in industry.”

This is just the kind of experience that NSF hopes to see from funding the REU program, as “active research experience is considered one of the most effective ways to attract talented undergraduates to and retain them in careers in science and engineering, including careers in teaching”. By providing early opportunities to be involved in research both NSF and our faculty members hope to produce strong candidates for graduate school, as well as top competitors for industry jobs. ☐☐

FACULTY

Bob Kessler was appointed to the Microsoft University Relations Advisory Board.

ALUMNI

Godmar Back (PhD '01) was selected as winner of the 2003 ACM SIGPLAN Doctoral Dissertation Award for his thesis on "Isolation, Resource Management and Sharing in the KaffeOS Java Runtime System".

Lixin Zhang (PhD '02) accepted a position at the IBM Research Lab in Austin, TX.

STUDENTS

Joe Kniss, a graduate student studying with Chuck Hansen (PhD '88), was awarded the DOE High-Performance Computer Science Fellowship.

Scott Little (BS '03), who entered as a graduate student this fall, was awarded a \$5,000 Micron Graduate Scholarship.

Students Compete for Top Honors in ACM Programming Contest

Competition was fierce as local universities rivaled for top honors at the annual ACM Programming Contest held November 15th. Led by Dave Hanscom, the University of Utah teams walked away with a number of victories. "Three of our teams did very well, solving four or five of the eight problems. All those who participated presented the potential to be winners in future years", said Hanscom.

Results of this years contest have inspired two School of Computing faculty members to offer a course in problem solving. This course will help students with algorithms and the situations in which to apply those algorithms. ☐☐

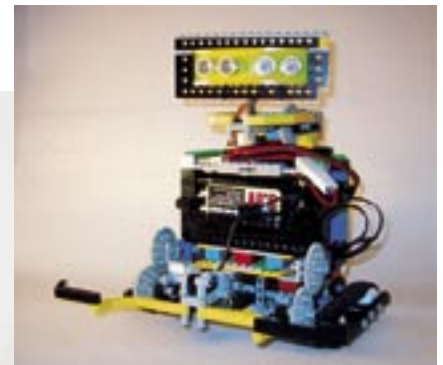
Interested in making internship opportunities at your company for University of Utah students? Contact Chris Coleman for more information. coleman@cs.utah.edu

Student Robot Competition

Computer Engineering students battled it out December 5th as they demonstrated their final projects to cap off their senior project course. The course was taught by Bruce Boyes, adjunct professor in the School of Computing and the Department of Electrical and Computer Engineering and Systronix Technical Director.

Student teams used LEGO Mindstorm™ kits, J-Stamp™ computer architecture, and the latest iteration of the Systronix JCX (for 'Java Control System') provided by Systronix to create their designs. This technology provides a realtime-capable implementation of the Java language. The use of object-oriented Java technology enabled the class to accomplish more in less time than would be possible with older languages and development tools. Projects included an intelligent robot that could scan and map a room with sonar, an autonomous checker playing robot, a portable, pocket-sized personal time logging system, and many others.

"This year we had up-to-date computers ready to go, and no delays due to building construction, so we were able to accomplish more in the same time as in previous years. Many teams augmented the Legos with other home-brew hardware, and some designed and built their own custom sensors. Two of my personal favorites this year were the Artificial Intelligence robot which played checkers with itself and the sonar mapping robot. Both these projects exhibited above-average commitment from their teams, and showed just how much can be accomplished in a short time by good people using good tools." said Boyes. ☐☐



Team WiJoNa: Sonar mapping bot



Team TBA: Checker Playing Bot

The Benefits of an Industrial Sabbatical

by Ganesh Gopalakrishnan

In the Winter 2001 Teapot, Al Davis summarized his 14-month sabbatical experience at Intel through an article with a similar title; I thought I'd follow suit here. I loaded up a 24' U-haul with 16 years of junk, and towing my 17-year old trusty Mazda 323, with my wife driving behind and reassuring me over the wireless that the car continued to be attached despite hitting massive potholes. After many scary moments (the truck overheating and apparently completely out of gas near Donner pass; turned out to be a loose ground wire), we reached Sunnyvale in one piece. Cindi Thompson and Bill Pierce, and my former PhD students Ratan Nalumasu and Ravi Hosabettu helped us unload what remained intact.

I worked in Intel's Platform Architectures group in Santa Clara on the problem of verification under limited observability. The focus was on detecting logical bugs that escape into silicon in multiprocessors - not to look for fabrication faults such as a transistor with its gate kinked out due to, say, dandruff on the fabrication mask. Observability into high-performance multiprocessors is limited because they no longer employ global bus structures. Rather, most

employ point-to-point connectivity, with many of the connections being inaccessible, owing to being contained within integrated circuit packages. So the questions are: what best to



Ganesh Gopalakrishnan

observe, how best to guess what can't be observed, and whether errors can still be identified. Note that the limited observability problem exists in other areas such as embedded systems also, given that everything ranging from nose ornaments to battle ships contain hundreds of processors, with not all processors easy to observe. Solving hard problems such as these takes several prerequisites: have good engineering intuition in hardware and software, be able to read and remember hundreds of pages of

formal specifications, and last but not least, employ mathematics 'without boundaries.'

While I may have an acceptable footing in the first two categories, I find myself constantly challenged by the third, which requires one to put the emphasis on problem solving, pulling in whatever mathematics it takes. It turns out that this is really what microprocessor design is all about. For the problem mentioned above, I can imagine needing to use constraint satisfaction techniques, formal verification and model-checking techniques, and AI techniques such as belief networks, all in one unified setting.

How has the sabbatical changed me? For one, I have a less convex midriff, as I played Badminton after a 20-year gap (I continue to play regularly after return). For another, I realized what a gastronomical delight the Bay area can truly be (especially in the South Indian food category). I also find myself occasionally opening an AI book or two. Last but not least, I made/renewed contacts, especially with the group with whom I worked. On the whole, if you have a sabbatical coming --"get outta here and come back different!!" Cheers. ☐☐

SoC Faculty Scholarship Recipient

School of Computing faculty awarded the Faculty Scholarship to senior Deb Ghosh for 2004. Funded by payroll deduction contributions from the faculty, this scholarship is the largest offered by the school. Deb is a computer science major and also works for the SCI Institute where she is working on the development of MANTA, a faster and more efficient Real Time Ray Tracer. ☐☐



Deb Ghosh



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UPCOMING EVENTS



February 4, 2004

Evans & Sutherland Distinguished
Lecture Series
Peter Schröder
Caltech

February 23, 2004

Evans & Sutherland Distinguished
Lecture Series
Randy Pausch
Carnegie Mellon University

March 1, 2004

Evans & Sutherland Distinguished
Lecture Series
Natarajan Shankar
Stanford Research Institute

March 8, 2004

Evans & Sutherland Distinguished
Lecture Series
Eric Grimson
MIT

March 29, 2004

Evans & Sutherland Distinguished
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Gene Myers
UC Berkeley

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Jim Gray
Microsoft Research



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